August 1965

# THE BREEDING POPULATION OF WATERFOWL ON THE CHIPPEWA NATIONAL FOREST

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The purpose of this paper is to describe the characteristics of the breeding waterfowl population on the Chippewa National Forest in north central Minnesota.

Highest waterfowl breeding densities have occurred geographically in the prairie pothole regions of western Minnesota, the Dakotas and the Prairie Provinces of Canada. The wooded region has, in the past, been assigned a rather unimportant position from the standpoint of waterfowl production. Recently, however, the woodland habitat has been receiving a "second look." Drainage of prairie wetlands continues to remove production habitat from the waterfowl flyways. Periodic drouth, compounded by the effects of drainage in the prairie region, has had catastrophic effects on waterfowl populations.

Wetlands within the wooded region, however, have not been drained to the extent of agricultural areas, and water table and run-off do not fluctuate as in the prairie situation. J. H. Stoudt pointed out that, "During the drouth of the '30's there is no doubt but that a shift of prairie nesting waterfowl occurred into the lake region of Minnesota"

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Paper presented at the 27th Midwest Fish and Wildlife Conference (1965), Lansing, Michigan.

(Williams, et. al., 1951). Shifting of prairie nesting waterfowl to other regions during periods of drouth has also been reported by Hansen and McKnight (1964).

The Chippewa N.F. occupies an important position in the Mississippi Flyway. The Forest comprises a gross land area of almost 1½ million acres with about 642,000 acres under multiple use management by the Forest Service, U. S. Department of Agriculture. It lies immediately adjacent to the prairie pothole region and is characterized by a great variety and abundance of lakes and wetlands. There are 1,217 lakes totaling 337,381 surface acres. In addition there are over 300,000 acres of wetlands, bringing the total aquatic habitat to 637,000 acres.

## SOURCES OF DATA

Brood Surveys. J. H. Stoudt initiated a waterfowl brood survey in 1937, designed to determine trends in duck production on the Forest. The survey has been accomplished each year since 1937, with the exception of 1942-1946, in essentially the same manner. Thus we have a series of comparable data for a period of 28 years. The survey was reported by Stoudt (1938) and has been summarized periodically in Special Scientific Reports of the U. S. Fish and Wildlife Service. The brood survey has become a cooperative venture with participants from the Bureau of Sport Fisheries and Wildlife, Minnesota Conservation Department, and U. S. Forest Service. Briefly, the survey consists of traversing the shoreline of selected lakes by canoe and recording all broods and adults by age class, species and brood size. The same areas are censused each year at the same phenological period. Ten separate areas are censused, totaling 65 shoreline miles.

Breeding Pair Counts. An intensive effort was made in 1965 to evaluate breeding pair use on all types of aquatic habitat on the Forest. Data recorded included wetland type, based on the classification system of the U. S. Fish and Wildlife Service (Shaw and Fredine, 1959), size, location and observed use by waterfowl. Data pertaining to breeding pairs are also available from studies of Johnson (1962) and unpublished surveys by the Minnesota Conservation Department on waterfowl management areas within the Chippewa N.F.

Wetland Inventory. A complete inventory and classification of wetlands on National Forest lands were accomplished in 1965 in cooperation with the Bureau of Sport Fisheries and Wildlife and the Minnesota Conservation Department. The technique and results were reported by Mathisen (1965). This inventory serves as a basis for projecting the breeding pair data. Wetland acreages as given in this report are for all lands within the Forest boundary. It was necessary to estimate wetland acreages for non National Forest lands based on proportional land ownership. An inventory of these additional wetlands will be made in 1966.

Other Studies. Other studies, broadening the base of waterfowl population knowledge for this area, include the work of Wellein (1942), Goodwin (1958), Marshall (1959), and production studies on the Tamarac National Wildlife Refuge.

## SPECIES COMPOSITION

General. The six major species encountered on the Chippewa are the mallard, blue-winged teal, American goldeneye, American widgeon,

ring-necked duck and wood duck. These species comprise over 90 percent of the breeding population. Of less importance is the bufflehead, redhead, green-winged teal, pintail and hooded merganser. Rarely seen is the blackduck, shoveler, ruddy duck and canvasback.

Changes in Species Composition. Figure 1 shows the relative abundance of the six major species for the period 1937-1965, based on annual brood counts on selected lakeshore. It is evident that significant changes in species composition have occurred through the years.

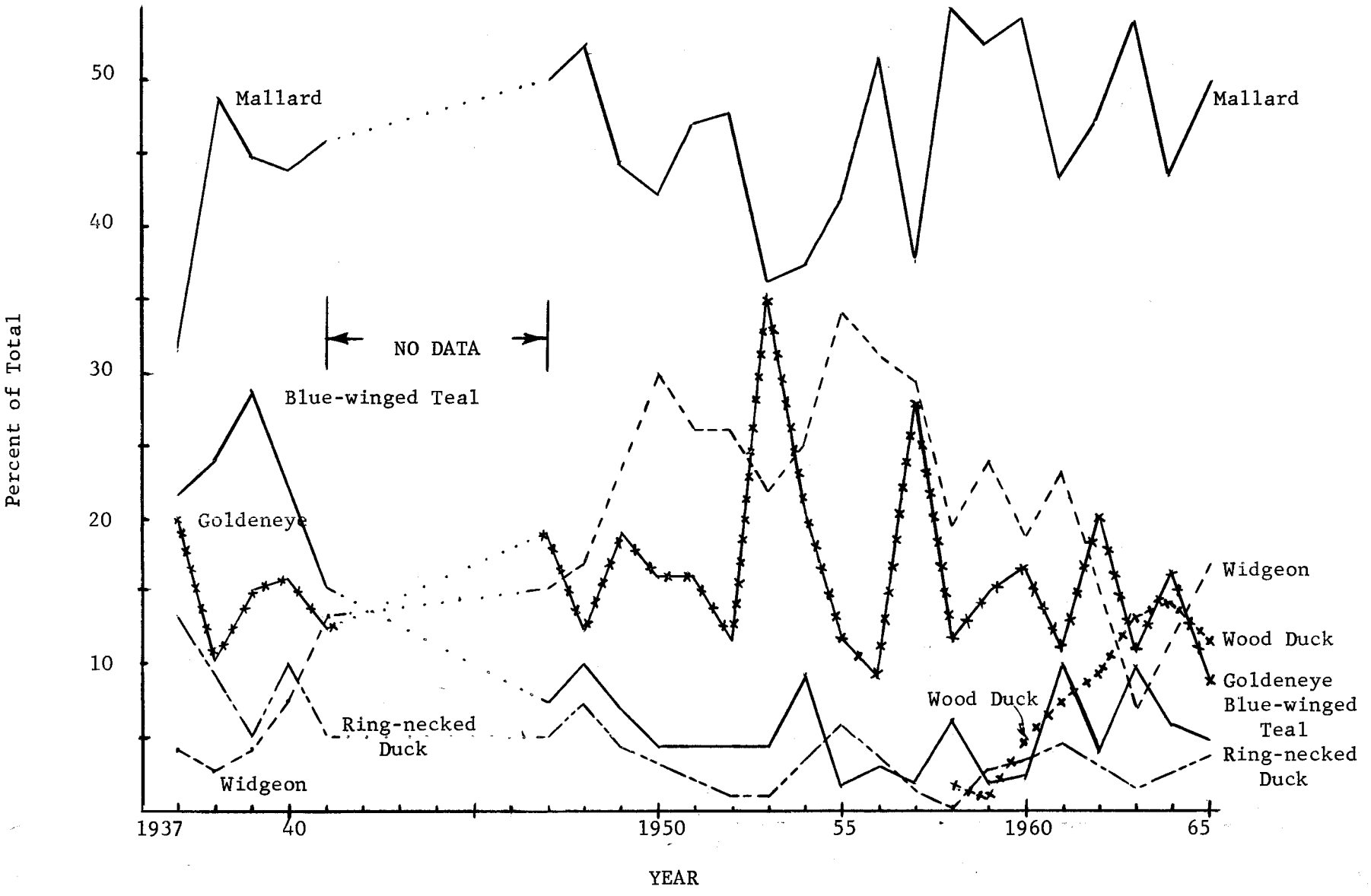
The mallard was consistently the most abundant, ranging from 32 percent to 57 percent of the total birds observed. The widgeon showed a steady increase from 1938 to 1950, bringing it from a species of minor importance to the second most abundant breeder on the Forest. It has shown a general downward trend since 1955.

The relative abundance of goldeneyes remained fairly constant through the years, except for a peak in 1953 and 1958. The goldeneye is an important breeder on the Chippewa, averaging 16 percent of the total observations for the 28 year period.

The blue-winged teal was extremely abundant during the early years of the survey (28 percent in 1939). The relative abundance of this species dropped radically between 1939 and 1950, when it accounted for only 6 percent of the total observations. This species has remained relatively constant since then.

Wood ducks were scarce from 1937 to 1950 when the species was considered occasional, or rare, on the survey lakes. Wood ducks, however, have

Figure 1. CHANGE IN WATERFOWL SPECIES COMPOSITION
CHIPPEWA NATIONAL FOREST
(Brood Surveys on Selected Lakes)



accounted for a substantial number of observations in recent years (13 percent in 1963 and 1964).

The ring-necked duck was most frequently observed during the period 1937-1948. The relative abundance of this species on the census lakes has remained low since then.

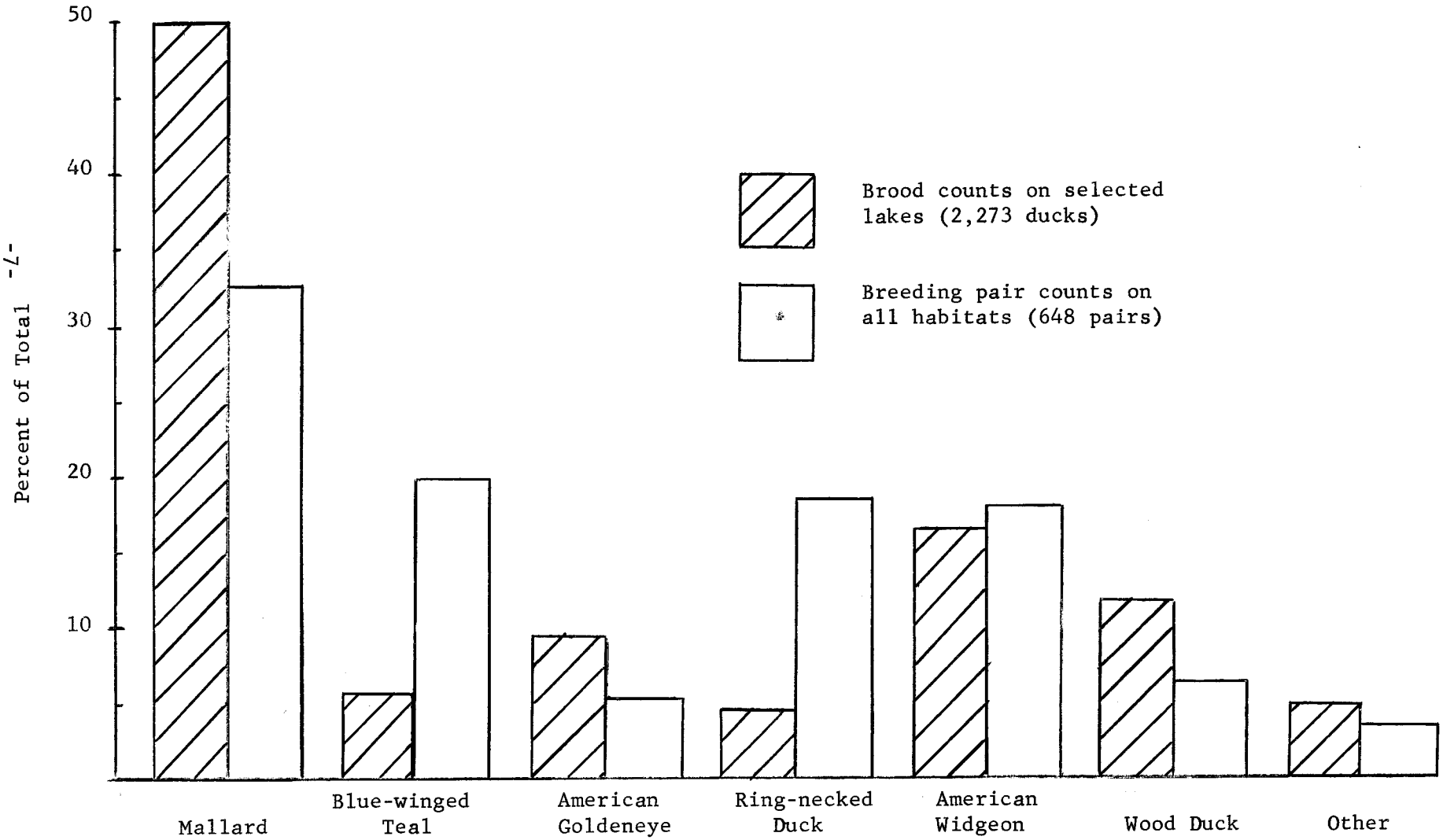
A number of factors influence the relative species composition on the study lakes. Changes in habitat resulting from water levels, natural succession and human activities have affected the species utilizing the census lakes. Habitat needs and the tolerance of various species to human disturbance varies. Range extension or contraction of a species could also be reflected during this period of 28 years. Variation in the time of the hunting season may have influenced species mortality, thus affecting relative abundance the following year.

The 1965 Breeding Population. The 1965 breeding pair counts provide data on species composition on a sample of all habitat types. The 1965 brood survey provides data on the post-hatch population on a sample of lakeshore. The results of the two surveys are compared graphically in Figure 2.

The major difference between the two sets of data is that the pair counts indicated a higher proportion of blue-winged teal and ring-necked ducks, and fewer goldeneyes and mallards.

This probably reflects the difference in habitat types surveyed. Teal seem to prefer rivers and streams, a type of habitat not censused in

Figure 2. WATERFOWL SPECIES COMPOSITION
CHIPPEWA NATIONAL FOREST
Minnesota
1965



the brood survey. Over 50 percent of the teal pair observations were on streams. Ring-necked ducks are most often observed on smaller wetlands (Marshall, 1959), accounting for their scarcity in the lake survey. Goldeneyes, on the other hand, prefer the larger, windswept lakes, and were not frequently recorded during the pair count survey.

The pair count data probably indicate more accurately the species composition on the Forest. However, there are certain qualifications that should be emphasized when evaluating these data:

1. The breeding pair survey was not based on a statistical model, and all habitat types were not censused proportionately.
2. Error could accrue from the variation in phenology of breeding time for the different species in relation to the time of the survey. The majority of the pair counts were taken during May 17-22 and June 7-10, although some observations were recorded during the entire breeding period.
3. The species vary in their observability, both as breeding pairs and broods.
4. Species composition as determined by the brood survey would reflect differentials in nesting success and brood survival, so that the two surveys are not entirely comparable.

## BREEDING PAIR DENSITY (1965)

Breeding pair counts were made during the 1965 wetland inventory. These data provide a means of estimating the magnitude of the breeding population on various habitat types.

Breeding pair data were divided into three categories of production habitat: lake shoreline, streams, and wetlands containing surface water. Pairs observed on temporary wetlands and permanent wetlands less than 2 acres in size were not used for projecting the population data. The amount of this habitat available is unknown in the case of temporary wetlands, and will vary considerably from year to year.

A summary of the habitat types and their relation to breeding pair density is presented in Table 1.

Table 1. Estimated Breeding Population Based on Observed Use and Available Habitat (1965)

| Type Of Habitat | Observed Use | Sample | Habitat Available | Projected Total Population | Estimated Duckling* Production |
|---|---|---|---|---|---|
| Lake Shoreline | 7 prs./mile | 21 miles (11 lakes) | 1,775 mi. | 12,400 | 37,200 |
| Streams | 6 prs./mile | 20 miles (10 streams) | 596 mi. | 3,600 | 10,800 |
| Type 3,4,5 Wetlands | 47 prs./100 A. (50% occupied) | 180 acres (34 areas) | 20,692 acres | 4,900 | 14,700 |
| TOTAL | | | | 20,900 | 62,700 |

* Based on 50 percent nesting success and average brood size of 6.

Lake Shoreline. Breeding pair counts by the wetland inventory crew and those of Johnson (1962) were generally in agreement. Johnson working on 49 miles of lakeshore determined 6 pairs/mile as compared to 7 pairs/mile on a more extensive basis by the inventory crew.

Although lake shoreline accommodates over half of the breeding pair population, its relative unit value to a breeding pair of ducks is

obscure. If we assume that the productive segment of a lake is confined to a strip one-eighth mile off shore, this relative value can be compared to other wetlands in terms of acres. Each mile of shoreline provides 80 acres of production habitat on this basis. Observed use on this type of habitat was, therefore, 9 pair/100 acres in 1965. It would appear that lake shoreline is not preferred by breeding pairs, but is important in the aggregate (142,000 acres).

Streams. The inventory crew determined a density of 9 pairs/mile on streams while Johnson's data indicated only 3 pairs/mile. Equal weight was given to these two sources in arriving at the 6 pairs/mile as indicated.

Wetlands. The intensity of use on wetlands is more difficult to evaluate. The indicated use of 47 pairs/100 acres is based on occupied habitat only. In 1965 about 50 percent of the wetlands with surface water were occupied by breeding pairs. This rate of occupancy is probably lower than average due to the great amount of temporary surface water present in 1965. The projected population figure takes into account the occupancy factor. Breeding pair densities on occupied wetlands from other areas are compared in Table 2.

Table 2. Comparison of Breeding Pair Density From Various Sources and Areas

| Area | Pairs/100 Acres (Occupied) | Reference |
|---|---|---|
| Chippewa N.F. | 47 | This Study |
| S. Wisconsin | 31 | Jahn (1964) |
| N. Wisconsin | 10 | Jahn (1964) |
| S. Dakota | 70 | Evans & Black (1956) |
| N.W. Minnesota | 160 | Farmes (1956) |
| New York | 10 | Benson & Perry (1965) |

These data indicate that breeding pair density on occupied wetlands on the Chippewa is midway between densities in Wisconsin and those recorded in the prairie pothole region. This is a reasonable conclusion since the Chippewa occupies a transition zone between the prairie and the wooded habitat.

The range of pair use on wetlands by size classes is indicated in Table 3.

Table 3. Breeding Pair Use of Wetlands by Size Classes

| Size Class (Acres) | Sample Size (Acres) | Pairs Observed | Prs./100 Acres |
|---|---|---|---|
| 1- 3 | 26 | 21 | 85 |
| 4- 7 | 80 | 40 | 51 |
| 8-11 | 74 | 24 | 32 |

This would indicate that larger wetlands support fewer breeding pairs per acre than smaller ones. Since the amount of edge available to breeding pairs does not increase in proportion to size, this is a reasonable conclusion.

Qualifications. The data as presented must be qualified for objective evaluation. The same qualifications will apply as indicated previously for the species composition data (page 8). In addition the following will apply:

1. No evaluation was made of pair use on small and temporary wetlands. Temporary surface water was an important component of habitat in 1965, especially for mallards. More intensive use would have been evident on permanent wetlands had there been fewer temporary water areas.
2. In 1965 the Mississippi Flyway population was considered low, especially the mallard segment of the population.
3. Water conditions in the prairie region were good in 1965, possibly resulting in relatively fewer ducks utilizing the woodland areas as compared to a dry year on the prairie.
4. The lakeshore data are biased to the degree that lakes vary in their production habitat capability, and projection of the data did not take this into account.
5. The population estimate is based on data for a single year, so statistics cannot be expressed in terms of a range between years.

Populations will fluctuate from year to year, and the data presented for 1965 cannot be evaluated in relative terms. It does, however, provide a base for further studies and serves to emphasize the importance of a woodland area in the Mississippi Flyway.

## SUMMARY


1. This paper brings together the characteristics of the breeding waterfowl population on the Chippewa National Forest.
2. Data pertaining to the waterfowl population were combined from various sources including a cooperative brood survey (1937-1965), breeding pair counts by various agencies, and research data from the Minnesota Conservation Department.
3. Species composition has changed considerably since 1937. The widgeon, blue-winged teal and wood duck are the species showing pronounced changes. The mallard, blue-winged teal, goldeneye, ring-necked duck, widgeon and wood duck comprise over 90 percent of the breeding population at the present time.
4. Breeding pair counts in 1965 projected to known wetland acreages indicate a breeding population of 20,900 pairs.
5. Observed use on various habitat types was 7 pairs/mile of lake shoreline, 6 pairs/mile of stream and 47 pairs/100 acres of other occupied wetland.
6. It is evident that the Chippewa National Forest makes a substantial contribution to the Mississippi Flyway population. The future of waterfowl may well depend on the so called peripheral breeding zones such as the wooded region, where production is perhaps not spectacular, but it is relatively constant. Certainly, woodland areas deserve further study and evaluation.

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